

WHAT IS CLAIMED IS:

1. An inkjet head comprising:

an ink passage unit including a plurality of pressure chambers and a plurality of wall portions defining each of the plurality of pressure chambers;

an actuator unit including a piezoelectric element disposed on the ink passage unit, a surface electrode disposed on the piezoelectric element and having a main electrode portion opposed to a pressure chamber and a connecting portion opposed to a wall portion, and a land disposed on the piezoelectric element in a region opposed to the wall portion, the land being electrically connected to the surface electrode;

a printed circuit board on which a terminal electrically connected to the land and a predetermined wiring pattern are provided;

a metallic bond for electrically connecting the land to the terminal, the metallic bond being disposed in at least one of a region between the land and the terminal and a region extending over the land and the terminal along the peripheries of the land and the terminal; and

a protrusion disposed on the connecting portion.

2. The inkjet head according to claim 1, wherein

the protrusion extends to the outside of the connecting portion to surround the land, the terminal, and the metallic bond.

3. The inkjet head according to claim 1, wherein the protrusion extends across the connecting portion substantially perpendicularly to a straight line extending through the main electrode portion and the land, to the outside of the connecting portion.

4. The inkjet head according to claim 1, wherein the protrusion connects the actuator unit and the printed circuit board.

5. The inkjet head according to claim 1, wherein the protrusion is made of a thermosetting resin.

6. The inkjet head according to claim 1, wherein the protrusion is made of an epoxy resin.

7. The inkjet head according to claim 1, wherein the plurality of pressure chambers are arranged in a matrix in a plane of the ink passage unit, and the piezoelectric element of the actuator unit has a size to extend over the plurality of pressure chambers.

8. An inkjet head comprising:
an ink passage unit including a plurality of pressure chambers and a plurality of wall portions defining each of the plurality of pressure chambers;

an actuator unit including a piezoelectric element disposed on the ink passage unit, a surface electrode disposed on the piezoelectric element and having a main electrode portion opposed to a pressure chamber and a connecting portion opposed to a wall portion, and a land disposed on the piezoelectric element in a region opposed to the wall portion, the land being electrically connected to the surface electrode;

a printed circuit board on which a terminal electrically connected to the land and a predetermined wiring pattern are provided;

a metallic bond for electrically connecting the land to the terminal, the metallic bond being disposed in at least one of a region between the land and the terminal and a region extending over the land and the terminal along the peripheries of the land and the terminal; and

a thermosetting resin covering at least part of the metallic bond.

9. The inkjet head according to claim 8, wherein the thermosetting resin extends to the outside of the connecting portion to surround the land, the terminal, and the metallic bond.

10. The inkjet head according to claim 8, wherein

the thermosetting resin extends across the connecting portion substantially perpendicularly to a straight line extending through the main electrode portion and the land, to the outside of the connecting portion.

11. The inkjet head according to claim 8, wherein the thermosetting resin is disposed in a region opposed to the wall portion.

12. The inkjet head according to claim 8, wherein the thermosetting resin is an epoxy resin.

13. The inkjet head according to claim 8, wherein the plurality of pressure chambers are arranged in a matrix in a plane of the ink passage unit, and the piezoelectric element of the actuator unit has a size to extend over the plurality of pressure chambers.

14. An inkjet head comprising:

an ink passage unit including a plurality of pressure chambers and a plurality of wall portions defining each of the plurality of pressure chambers;

an actuator unit including a piezoelectric element disposed on the ink passage unit, a surface electrode disposed on the piezoelectric element and having a main electrode portion opposed to a pressure chamber and a connecting portion opposed to a wall portion, and a land disposed on the piezoelectric element in a region opposed

to the wall portion, the land being electrically connected to the surface electrode;

a printed circuit board on which a terminal electrically connected to the land and a predetermined wiring pattern are provided; and

a thermosetting resin for electrically connecting the land to the terminal, the thermosetting resin being disposed in a region opposed to the wall portion.

15. The inkjet head according to claim 14, wherein the thermosetting resin extends to the outside of the connecting portion to surround the land and the terminal.

16. The inkjet head according to claim 14, wherein the thermosetting resin is an ACP (Anisotropic Conductive Paste).

17. The inkjet head according to claim 14, wherein the plurality of pressure chambers are arranged in a matrix in a plane of the ink passage unit, and the piezoelectric element of the actuator unit has a size to extend over the plurality of pressure chambers.

18. A manufacturing method of an inkjet head comprising an ink passage unit including a plurality of pressure chambers and a plurality of wall portions defining each of the plurality of pressure chambers; an actuator unit including a piezoelectric element disposed

on the ink passage unit, a surface electrode disposed on the piezoelectric element and having a main electrode portion opposed to a pressure chamber and a connecting portion opposed to a wall portion, and a land disposed on the piezoelectric element in a region opposed to the wall portion, the land being electrically connected to the surface electrode; and a printed circuit board on which a terminal electrically connected to the land and a predetermined wiring pattern are provided,

the method comprising steps of:

forming a protrusion on the connecting portion;
disposing a metallic bond between the terminal and the land; and

pressing the land and the terminal so that they are brought near each other, for electrically connecting the land and the terminal to each other with the metallic bond being disposed in at least one of a region between the land and the terminal and a region extending over the land and the terminal along the peripheries of the land and the terminal.

19. The method according to claim 18, wherein the protrusion is formed so as to extend to the outside of the connecting portion and surround the land, the terminal, and the metallic bond.

20. The method according to claim 18, wherein the protrusion is formed so as to extend across the connecting portion substantially perpendicularly to a straight line extending through the main electrode portion and the land, to the outside of the connecting portion.

21. The method according to claim 18, wherein the protrusion is formed so as to connect the actuator unit and the printed circuit board.

22. The method according to claim 18, wherein the protrusion is made of a thermosetting resin.

23. The method according to claim 18, wherein the protrusion is made of an epoxy resin.

24. The method according to claim 18, wherein the plurality of pressure chambers are arranged in a matrix in a plane of the ink passage unit, and lands are provided to correspond to the respective pressure chambers.

25. A manufacturing method of an inkjet head comprising an ink passage unit including a plurality of pressure chambers and a plurality of wall portions defining each of the plurality of pressure chambers; an actuator unit including a piezoelectric element disposed on the ink passage unit, a surface electrode disposed on

the piezoelectric element and having a main electrode portion opposed to a pressure chamber and a connecting portion opposed to a wall portion, and a land disposed on the piezoelectric element in a region opposed to the wall portion, the land being electrically connected to the surface electrode; and a printed circuit board on which a terminal electrically connected to the land and a predetermined wiring pattern are provided,

the method comprising steps of:

disposing a metallic bond and a thermosetting resin between the terminal and the land;

pressing the land and the terminal so that they are brought near each other, for discharging at least part of the thermosetting resin from a gap between the land and the terminal, and bring at least one of the terminal and the metallic bond into contact with the land; and

heating the metallic bond and the thermosetting resin so that the land and the terminal are electrically connected to each other with the metallic bond being disposed in at least one of a region between the land and the terminal and a region extending over the land and the terminal along the peripheries of the land and the terminal, and a protrusion made of the thermosetting resin is formed at least in the connecting portion

between the main electrode portion and the land.

26. The method according to claim 25, wherein the protrusion is formed so as to extend to the outside of the connecting portion and surround the land, the terminal, and the metallic bond.

27. The method according to claim 25, wherein the protrusion is formed so as to extend across the connecting portion substantially perpendicularly to a straight line extending through the main electrode portion and the land, to the outside of the connecting portion.

28. The method according to claim 25, wherein the protrusion is formed so as to connect the actuator unit and the printed circuit board.

29. The method according to claim 25, wherein the protrusion is made of an epoxy resin.

30. The method according to claim 25, wherein the plurality of pressure chambers are arranged in a matrix in a plane of the ink passage unit, and lands are provided to correspond to the respective pressure chambers.

31. A manufacturing method of an inkjet head comprising an ink passage unit including a plurality of pressure chambers and a plurality of wall portions

defining each of the plurality of pressure chambers; an actuator unit including a piezoelectric element disposed on the ink passage unit, a surface electrode disposed on the piezoelectric element and having a main electrode portion opposed to a pressure chamber and a connecting portion opposed to a wall portion, and a land disposed on the piezoelectric element in a region opposed to the wall portion, the land being electrically connected to the surface electrode; and a printed circuit board on which a terminal electrically connected to the land and a predetermined wiring pattern are provided,

the method comprising steps of:

disposing a metallic bond and a thermosetting resin between the terminal and the land;

pressing the land and the terminal so that they are brought near each other, for discharging at least part of the thermosetting resin from a gap between the land and the terminal, and bring at least one of the terminal and the metallic bond into contact with the land; and

heating the metallic bond and the thermosetting resin so that the land and the terminal are electrically connected to each other with the metallic bond being disposed in at least one of a region between the land and the terminal and a region extending over the land and the

terminal along the peripheries of the land and the terminal, and at least part of the metallic bond is covered with the thermosetting resin.

32. The method according to claim 31, wherein the thermosetting resin is formed in the heating step so as to extend to the outside of the connecting portion and surround the land, the terminal, and the metallic bond.

33. The method according to claim 31, wherein the thermosetting resin is formed in the heating step so as to extend across the connecting portion substantially perpendicularly to a straight line extending through the main electrode portion and the land, to the outside of the connecting portion.

34. The method according to claim 31, wherein the thermosetting resin is formed in the heating step in a region not opposed to the connecting portion.

35. The method according to claim 31, wherein the thermosetting resin is an epoxy resin.

36. The method according to claim 31, wherein the plurality of pressure chambers are arranged in a matrix in a plane of the ink passage unit, and lands are provided to correspond to the respective pressure chambers.

37. A manufacturing method of an inkjet head

comprising an ink passage unit including a plurality of pressure chambers and a plurality of wall portions defining each of the plurality of pressure chambers; an actuator unit including a piezoelectric element disposed on the ink passage unit, a surface electrode disposed on the piezoelectric element and having a main electrode portion opposed to a pressure chamber and a connecting portion opposed to a wall portion, and a land disposed on the piezoelectric element in a region opposed to the wall portion, the land being electrically connected to the surface electrode; and a printed circuit board on which a terminal electrically connected to the land and a predetermined wiring pattern are provided,

the method comprising steps of:

disposing a thermosetting resin between the terminal and the land;

pressing the land and the terminal so that they are brought near each other, for bring at least one of the terminal and the thermosetting resin into contact with the land; and

heating the thermosetting resin so that the land and the terminal are electrically connected to each other with the thermosetting resin being disposed in a region opposed to the wall portion .

38. The method according to claim 37, wherein the thermosetting resin is formed in the heating step so as to extend to the outside of the connecting portion and surround the land and the terminal.

39. The method according to claim 36, wherein the thermosetting resin is an ACP (Anisotropic Conductive Paste).

40. The method according to claim 36, wherein the plurality of pressure chambers are arranged in a matrix in a plane of the ink passage unit, and lands are provided to correspond to the respective pressure chambers.